

## Change of Ginosenosides on Hydroponics Ginseng Roots and leaves with Heat Treatment

Department of Food Science and Technology, Chungbuk National University  
Cho Rong Hwang, Hyun Young Kim, Sang Hoon Lee, Seung Hee Oh, Eun Mi Song, Su  
Jeong Jeong, Gwi Yeong Jang, You Ri Kang, Jin Sook Park, Heon Sang Jeong.

### Objectives

To investigate the changes of ginsenosides on hydroponics ginseng roots and leaves with various heating temperature

### Materials and Methods

#### ○ Materials

The hydroponics ginseng roots and leaves were rinsed with water, dried at room temperature and stored at -20°C in darkness room. Standards ginsenosides Rb1, Rb2, Rb3, Rc, Rd, Re, Rf, Rg1, Rg2(S), Rg3(S), Rh1, and Rh2 were purchased from Wako Pure Chemical (Osaka, Japan), and F2, F4, Rg2(R), Rg3(R), Rg5, Rh4, Rk1, and Rk3 were purchased from Ambo Institute (Seoul, Korea).

#### ○ Methods

The hydroponics ginseng roots and leaves heated at 90, 110, 130, 150 °C for 2 hrs, and then extracted with 80% ethanol. The ginsenoside contents measured by HPLC methods.

### Results

The ginsenoside contents were significantly differences with heating temperature. In case of leaves, the level of ginsenoside-Rg1, -Re, and -Rf decreased to 150°C. The level of ginsenoside-Rb1, -Rh1, -Rb2, -Rd, and -F2 increased to 110°C, and ginsenoside-Rg2(S), Rg2(R), -Rb3, and -F4 increased to 130°C, and then decreased afterward. The ginsenosides-Rk3, -Rh4, -Rg3(S), -Rg3(R), -Rk1, and -Rg5 increased to 150°C. Ginsenoside-F2, -F4, -Rk3, -Rh4, Rg3(S), Rg3(R), -Rk1, and -Rg5, which were absent in raw ginseng, were detected after heating. In case of roots, the level of ginsenoside-Rg1, -Re, and -Rf decreased to 150°C. The level of ginsenosides-Rb1, -Rh1, -Rg2(S), Rg2(R), and -Rd increased to 90°C, and ginsenoside-Rd, and -Rb2 increased to 110°C, and then decreased afterward. The ginsenosides-Rb3, -F2, -F4, -Rk3, -Rh4, -Rg3(S), Rg3(R), -Rk1, -Rg5 increased to 150°C. Especially, ginsenoside-F2, -F4, -Rk3, -Rh4, Rg3(S), Rg3(R), -Rk1, and -Rg5 were remarkably produced after heating.

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주저자 연락처(Corresponding author): 정현상 E-mail: hsjeong@cbnu.ac.kr Tel: 043-261-2570

Table 1. Changes of ginsenoside contents with heating temperatures.

Temperature (°C)	Time (hr)	Ginsenosides (mg/g, dry sample)								
		Rg1	Re	Rf	Rb1	Rh1	Rg2(S)	Rg2(R)	Rb2	Rb3
Raw material		2.723±0.105	9.431±0.047	1.156±0.452	1.492±0.137	1.473±0.214	0.295±0.011	N.D	N.D	0.145±0.047
90	2	2.217±0.042	3.418±0.132	1.062±0.177	1.414±0.169	1.929±0.180	0.554±0.101	0.884±0.046	0.702±0.167	0.244±0.036
110		1.058±0.052	1.841±0.028	0.411±0.000	1.855±0.109	2.096±0.120	0.819±0.066	0.906±0.013	0.709±0.05	0.491±0.023
130		0.157±0.003	0.311±0.003	0.197±0.018	0.096±0.009	0.103±0.002	1.452±0.028	0.989±0.009	0.090±0.000	1.131±0.016
150		0.050±0.001	0.123±0.011	0.087±0.007	N.D	N.D	N.D	N.D	N.D	1.035±0.067

  

Temperature (°C)	Time (hr)	Ginsenosides (mg/g, dry sample)								
		Rd	F2	F4	Rk3	Rh4	Rg3(S)	Rg3(R)	Rk1	Rg5
Raw material		5.568±0.587	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
90	2	7.815±0.498	0.194±0.060	0.116±0.021	0.304±0.033	N.D	0.508±0.015	0.165±0.041	0.136±0.008	0.431±0.005
110		9.716±0.503	0.622±0.024	0.456±0.045	0.374±0.083	0.051±0.002	0.586±0.030	0.231±0.027	0.170±0.017	0.500±0.002
130		1.231±0.029	0.538±0.020	0.939±0.011	1.008±0.040	0.287±0.017	3.002±0.354	1.222±0.065	2.246±0.052	1.405±0.057
150		0.107±0.019	0.177±0.022	0.821±0.033	1.443±0.102	0.447±0.111	2.347±0.099	1.687±0.213	3.296±0.078	2.328±0.052

Table 2. Changes of ginsenoside in Roots with heating temperatures.

Temperature (°C)	Time (hr)	Ginsenosides (mg/g, dry sample)								
		Rg1	Re	Rf	Rb1	Rh1	Rg2(S)	Rg2(R)	Rb2	Rb3
Raw material		1.662±0.122	2.276±0.088	0.968±0.018	1.973±0.065	1.688±0.284	0.294±0.063	N.D	0.049±0.006	0.018±0.000
90	2	0.638±0.146	0.787±0.107	0.814±0.044	3.302±0.025	3.307±0.340	0.128±0.028	1.765±0.019	0.490±0.019	0.063±0.005
110		0.336±0.035	1.136±0.025	0.301±0.034	1.419±0.044	1.446±0.142	0.839±0.035	0.387±0.049	0.387±0.049	0.143±0.021
130		0.108±0.003	0.083±0.000	0.133±0.009	0.099±0.001	0.088±0.004	0.288±0.017	0.220±0.036	0.060±0.000	0.803±0.009
150		0.023±0.001	0.022±0.002	N.D	N.D	N.D	N.D	N.D	N.D	0.501±0.000

  

Temperature (°C)	Time (hr)	Ginsenosides (mg/g, dry sample)								
		Rd	F2	F4	Rk3	Rh4	Rg3(S)	Rg3(R)	Rk1	Rg5
Raw material		0.467±0.066	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
90	2	1.776±0.047	0.041±0.001	0.013±0.002	0.060±0.027	0.008±0.003	0.340±0.003	0.159±0.003	0.057±0.004	0.308±0.007
110		0.701±0.037	0.099±0.005	0.170±0.008	0.034±0.000 0	0.006±0.000	0.634±0.010	0.315±0.018	0.387±0.013	0.291±0.010
130		0.284±0.041	0.083±0.003	0.217±0.003	0.523±0.030	0.153±0.002	3.087±0.030	1.712±0.006	2.699±0.022	2.004±0.094
150		N.D	N.D	0.148±0.002	0.465±0.016	0.149±0.009	0.731±0.096	0.795±0.035	2.235±0.005	2.183±0.051